

REMARKS

Claims 1-27 are pending in the present application. Claim 16 has been amended. Reconsideration and allowance of the claims is respectfully requested in view of the following remarks.

Applicants note that an initialed copy of the Information Disclosure Statement submitted on July 9, 2002 has not received. Applicants request that an initialed copy be returned with the response to this Amendment.

1. Claim Rejections Under 35 U.S.C. §112, second paragraph

Claims 8, 14, 16, and 23-27 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter which the Applicants' regard as the invention. In particular the Examiner alleges that the use of the term "nanostructured" in Claims 8, 14, and 23 is indefinite because it is unclear as to what is meant. Applicants disagree.

Applicants respectfully submit that the Specification, on Page 1, line 9 to Page 2, line 7, reproduced for convenience below, the particle sizes referred to in the Specification are defined.

Micron-, submicron-, and nanosized carbide powders are important materials for engineering applications. As used herein, "micron-sized" powders refers to powder particles wherein the mean particle size is equal to or greater than about 1.0 microns. "Submicron-sized" powders refers to powder particles wherein the mean particle size is in the range from about 0.1 to about 1.0 microns. "Nanosized" powders refers to powder particles wherein the mean particle size is less than about 0.1 micron (about 100 nm). In certain instances, micron- and submicron-sized particles comprise many nanosized crystalline grains rather than a single, large grain. In these cases, the particles are referred to as "micron- and/or submicron-sized particles with nanostructures" or "micron- and/or submicron-sized, nanostructured particles." Nanosized and micron- and/or submicron-sized,

nanostructured particles have a high fraction of atoms located at the grain boundaries of the particle. Such materials accordingly have different, and often advantageous properties compared to conventional particles having the same chemical compositions.

It is clear from the above paragraph that “particles comprising nanosized crystalline grains”, “particles with nanostructures” and “nanostructured particles” are equivalent terms. Nanosized is clearly defined as having a mean particle size of less than about 100 nanometers. From the definitions presented above, it is clear that nanostructured refers to a material having nanosized crystalline grains, i.e., grains of size less than 100 nanometers. Applicants thus submit that the Specification is clear as to what is meant by nanostructured.

Claim 16 has been rejected due to the use of the word “precursor”. Applicants have amended the claim to read "source" as suggested by the Examiner.

In view of the foregoing amendments and remarks withdrawal of the rejection of Claims 8, 14, 16, and 23-27 under 35 U.S.C. §112 and allowance of said claims is respectfully requested.

2. Claim Rejections Under 35 U.S.C. §103(a)

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,651,950 to Lee et al. (hereinafter Lee ‘950) taken with U.S. Patent No. 5,030,286 to Crawford et al. (hereinafter Crawford). In making the rejection the Examiner has asserted that it would have been obvious to use the milling of Crawford in the process of Lee because doing so makes the small particles desired. Applicants respectfully disagree with the rejection.

Lee '950 discloses that the mesophase of coal-tar pitch is highly reactive and can be used a catalyst to produce silicon carbide. (Col.1, lines 49-62 and Col. 2, line 52-53). Lee '950 does not teach a method of making a cermet, but rather a method of making silicon carbide. While silicon carbide can be part of a cermet, a cermet must have a ductile metal phase in addition to a hard ceramic phase such as a carbide.

Crawford is directed to silica slurries and methods of making them. Crawford does not teach or suggest the production of a cermet. Further, the process described in Crawford is shear milling (Column 5, lines 57-60) and not the high energy ball milling as presently claimed.

Claim 1 is directed to a method for the synthesis of carbide cermet powders, not merely carbide powders. As is well-known to those of skill in the art, a cermet is a composite material made of a hard ceramic phase such as silicon carbide combined with a ductile metal such as cobalt that functions as a metal binder (see page 12, lines 3-20 of the Specification). Lee is directed to methods of making silicon carbide, not a carbide cermet and Crawford is directed to the production of silica slurries. Applicants submit that neither Lee nor Crawford discloses the production of a cermet and thus there is at least one element of the present claims that is not taught by the references. If one were to properly combine Lee and Crawford, one would obtain silicon carbide and not a cermet.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants assert that the Examiner has failed to establish a prima facie case of obviousness because neither Lee nor Crawford teaches a method of making a cermet. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 3 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lee taken with Crawford and further in view of U.S. Patent No. 4,742,029 to Kurachi et al. (hereinafter “Kurachi”). The combination of Lee and Crawford was discussed above. Kurachi has been cited for its teaching with regard to carbon sources and does not teach or suggest method of making a cermet. Because Kurachi does not teach methods of forming a cermet, Kurachi fails to cure the defects of Lee and Crawford. Reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are requested.

3. Claim Rejections Under 35 U.S.C. §102(e)

Claims 1-5, 7-14, 16-21, and 23-26 stand rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 5,746,803 to Dunmead et al. (hereinafter “Dunmead”). Applicants respectfully traverse the rejection. In making the rejection, the Examiner states “Dunmead teaches in column 7 and ex. 1 ball-milling carbon black and metal oxide” (Paper 12, Page 3). The Examiner further states “[w]hile not explicitly teaching ‘high energy’, the 50 rpm recited appears to be ‘high’” (Paper 12, Page 3). The Examiner goes on to state “In any event, using the claimed milling is an obvious expedient to make fine particle size for more efficient reaction (col. 5 middle).” (Paper 18, page 3)

Dunmead discloses a method of forming a transition metal carbide-Group VIII metal powder comprising heating an admixture of a particulate precursor, Group VIII metal powder source and a finishing source of carbon to a temperature of about 1173K to about 1773K (Abstract). The particulate precursor comprises a metal containing tungsten and a precursor carbide of a transition metal (Dunmead, Claim 1).

The pending Claims are directed to a method for the synthesis of carbide cermet powders comprising high-energy ball milling a mixture of carbide cermet precursor powders and a carbon source to form an as-milled powder, and annealing the as-milled powder to form a carbide cermet powder. Applicants maintain that high-energy ball milling is a known term of art in the Mechanical Alloying field. As further support for this statement, Applicants refer the Examiner to U.S. Patent No. 5,773,922 to Lee et al., filed on Nov. 30, 1995 (Lee '922). A copy of U.S. Patent No. 5,773,922 was previously provided. As described in Lee '922, high-energy ball milling is performed when "the ball mill is operated at a relatively higher rotating speed of 300-700 rpm for 10-50 hours" (Column 3, lines 22-26). Thus, high-energy ball milling is a term of art referring to ball milling performed at speeds of over 300 rpm. In light of Lee '922, Applicants assert that Dunmead's teaching of ball milling at 50 rpm cannot be considered high-energy ball milling.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima

facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants believe the Dunmead et al. does not provide an adequate basis for a rejection under 35 U.S.C §102(e) or 35 U.S.C. §103(a) because Dunmead et al. does not contain all the elements of the pending claims, high-energy ball milling in particular.

For at least these reasons, Dunmead does not render the present claims obvious. For at least these reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) are requested.

Claims 1, 2, 4, 8-10, and 14 stand rejected under 35 U.S.C. §102(e) as being anticipated, or in the alternative under 35 U.S.C. §103(a) as obvious over by El-Eskandarandy et al., Metallurgical and Materials Transactions 27A, 4210, 1996 (hereinafter “El-Eskandarandy”). In making the rejection, the Examiner states “The reference teaches on pg. 4210 high energy milling carbon, W oxide and an extra metal, then leaching/washing then annealing. N[o] differences are seen in the product made” (Paper 12, Page 3). Applicants respectfully traverse the rejection.

El-Eskandarandy discloses a method of making tungsten carbide by solid-state high-energy ball milling WO_3 , Mg and C powders (Page 4210, Column 2). The Mg functions as a reducing agent in the production of tungsten carbide and is converted to MgO_2 which is leached out during the process to leave the desired tungsten carbide (Page 4211, Column 1, lines 6-15). El-Eskandarandy states in Col. 1 on page 4211 “The hardness value of our consolidated WC is much higher than the reported value.”^[4] This is because no binding materials such as metallic Co were added during the sintering process and, hence the as-

consolidated sample is pure WC that must have a higher hardness phase.” Because the Mg is converted to MgO_2 which is leached out there is no ductile phase present making it clear that El-Eskandarandy does not disclose the formation of a cermet, but rather tungsten carbide, a carbide powder.

As discussed in detail above, Claim 1 is directed to a method of making a carbide cermet powder. Similarly, Claim 9 is also directed to a method of making a carbide cermet powder. Also as discussed above, to anticipate a claim, a reference must have all of the elements arranged as in the claim. Because El-Eskandarandy teaches a method of forming tungsten carbide and not a cermet, El-Eskandarandy does not teach the method of Claims 1, 2, 4, 8-10, and 14. While an “extra metal” is used in the method, this metal is present as a reactant in the formation of tungsten carbide and is oxidized to MgO_2 which is leached out from the tungsten carbide powder produced in the reaction. Applicants assert that El-Eskandarandy does not disclose the formation of a cermet. For at least the foregoing reasons, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) are requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants.

Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by the Applicants' Attorney.

Respectfully submitted,

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